

# RED HORSE Triumphs with Technology

*A massive airfield project puts civil engineers on the leading edge of military construction*

by Capt Ryan J. Novotny  
819th ERHS

Just two short years ago a small group of personnel from three RED HORSE units began planning the largest and most complicated military construction effort ever undertaken in RED HORSE's 37-year history. Then, Operation ENDURING FREEDOM energized many new heavy construction requirements, placing the \$18 million rehabilitation of the airfield at a forward deployed location solely on the shoulders of the 819th/219th Expeditionary RED HORSE Squadron from Malmstrom Air Force Base, MT. The massive undertaking was driven by an approximately 2,000-foot section of failed asphalt on the runway and parallel taxiway at this deployed operating location. The airfield flooded with even small amounts of rain, and pilots had to weave through the 1.5-foot vertical depressions while taxiing.

The 819th/219th ERHS jumped into action and mobilized by moving 317 short tons of tools and equipment to the location by air and sea. The ADVON team arrived in September 2002 and began dewatering, establishing command and control, and preparing for the remainder of the team. By the end of the month the team was 160 personnel strong, with crews working in shifts seven days per week, 24 hours per day.

## Water, Water Everywhere ...

Successful construction hinged on dewatering the airfield, and the ADVON team hit the ground running. Drainage ditches were dug, and in one month more than 3 million gallons of water had been removed. Keeping water away from the new runway and taxiway sections involved placing gravity drains in a rock drainage layer constructed within them. About 150,000 tons of earthen material was removed from the infields for positive drainage away from the airfield surface, and seven area inlets were installed along with a collection vault with adjoining pump vault.

Conventional open trench construction is costly and time consuming when installing utilities. The 819th/219th ERHS turned toward the future and trenchless technology. A horizontal boring machine was used to tunnel beneath the airfield pavement and install steel casing for the new HDPE (high density polyethylene) drainage line. The specialized training required paid off, saving 1,500 man-hours during the project and establishing the 819th/219th ERHS as the first military construction unit in Department of Defense history to complete a horizontal bore.

## A Stakeless Job Site — the Future is Now

A comprehensive survey was required of the entire airfield — covering 12 million square feet. Months earlier, engineering personnel studied the use of Global Positioning System technology to do the survey. A conventional survey would take weeks to collect, record and analyze the large amounts of information needed. With handheld GPS surveying instruments, 2,500 data points were collected in approximately two days by only two people. Raw data was brought to life by linking 10,000 design points to the existing site.

"You can go anywhere on the site and find out cut and fill instantly ... it's great," said TSgt John Martin, surveying

NCOIC. "We were essentially able to run five jobs concurrently with only two surveyors."

Before deploying, the 819th/219th ERHS purchased a motor grader with an integrated GPS guidance system. Anywhere the operator drove on the airfield, the grader blade would match the design required at that location. GPS was used for every aspect of the project, saving 6,000 hours in surveying and construction. The 819th/219th ERHS is the first military construction unit to rely completely on GPS for all surveying and construction, making the job completely stakeless, and the first Air Force unit to use GPS with earth-moving equipment.



TSgt John Martin uses GPS to survey. Points are transferred to the GPS-integrated grader for construction. (DOD photo)

## Rejuvenating the Runway

Airfield rehabilitation began with cold milling the full-depth repair area and continued by removing two inches of asphalt from the remainder of the asphalt surface. The 819th/219th ERHS had very little milling experience prior to this project, and each pass of the milling machine required tremendous accuracy to retain the existing properties of the pavement. To beat the learning curve, the whole team took a one-week milling course and arranged for a technical representative to spend three days on site to educate the crew.

During training, team members became experts at using the sonic sensors on the machine to automatically adjust the cutting head to the programmed depth. The technology and training paid off for the team, which completed milling the 1.3 million-square-feet of asphalt pavement in just 30 days. All the milling created asphalt material that was used to construct the shoulders, and the milling machine paid for itself in one project.

Milling created a great surface for the new overlay to lock into the pavement structure. With the surface now prepared, the paving team fired up the screed. Meeting tolerance on airfield pavement with a one-eighth inch vertical change in 12 feet is